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David C Sherrett

No 154 South 9th Street
Pa.

Medus operandi of Mercury
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David Christie Sherrett -

Penn^a -

admitted March 30. 1820

James Smith
about 1800

*A Dissertation
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Modus Operandi
of
Mercury.)*

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A
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No originality in an essay on any branch of medical science, cannot be expected from one, who has devoted but three or four years in acquiring a knowledge of its various branches. A science which presents so wide and diversified a field for inquiry and research, as would occupy the most diligent student, many years, to examine attentively, the various theories, that have at different times prevailed.

The subject of this essay, is one, on which I cannot hope for originality; and the difficulties of which are so well expressed, by Dr. John Warren of Massachusetts, that I shall take the liberty of quoting

The first of these is the establishment of a
 system of public instruction, which is
 the foundation of all other improvements.
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 The sixteenth is the establishment of a
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 The twentieth is the establishment of a
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his own words; "Sensible of the extreme difficulty of establishing any rational theory on the modus operandi of mercury, I offer these suggestions with great diffidence, far from being ambitious of originality, on one hand, and very little studious, on the other, of conforming them to any system whatever.

When a man of such extensive experience, acknowledges the difficulties attendant on the establishing of a rational theory, any thing from me beyond a compilation cannot be expected.

The examination of some of the preparations of the medicine, will be necessary, to explain their effects on the body, and the different degrees of activity which they possess.

Mercury has been very aptly denominatid the samson of the *ollateria Medica*. It is the dictate of prudence to be assured, before we admit it into the strong holds of the system, whether it will act the part of a friend, in defending it against the disease that assails it; or, whether it may

The first of these is the fact that the human mind is not a blank slate, but is filled with ideas and impressions from the world around it. These ideas and impressions are the result of the senses, which are constantly receiving information from the external world. The mind then processes this information, and stores it in memory. This process is continuous, and is the basis of all human knowledge and action.

The second of these is the fact that the human mind is not a passive receiver of information, but is an active participant in the process. The mind is constantly interpreting the information it receives, and is constantly making decisions about what to do with it. This process is also continuous, and is the basis of all human thought and action.

The third of these is the fact that the human mind is not a single entity, but is composed of many different parts. These parts are the different faculties of the mind, such as the senses, the memory, the imagination, and the reason. Each of these faculties has its own distinct function, and they all work together to form the human mind.

The fourth of these is the fact that the human mind is not a static entity, but is constantly changing. The mind is constantly growing and developing, and is constantly being shaped by the experiences it has. This process is also continuous, and is the basis of all human progress and improvement.

The fifth of these is the fact that the human mind is not a private entity, but is a social entity. The mind is constantly interacting with the minds of other people, and is constantly being shaped by these interactions. This process is also continuous, and is the basis of all human culture and civilization.

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not be likely to pull down the pillars of the human constitution.

That such suspicions have existed, and do still exist, a history of this practice sufficiently evinces, and which are further corroborated, by the assertion of one of the most respectable practitioners of this city, who states that he has to regret the average loss of one patient a year, and yet he cannot reproach himself with an improper use of the remedy.

In investigating the effects of this medicine upon the human body, the subject naturally divides itself into the following heads.

- 1st The nature of the medicine, and of its preparations;
- 2^d Its general operation upon the living body.

Under the first of these heads, it would be proper to examine such preparations of mercury as are in common use.

Under the second the manner of their operation upon the human constitution.

Mercury is a metal of a silver-white colour;

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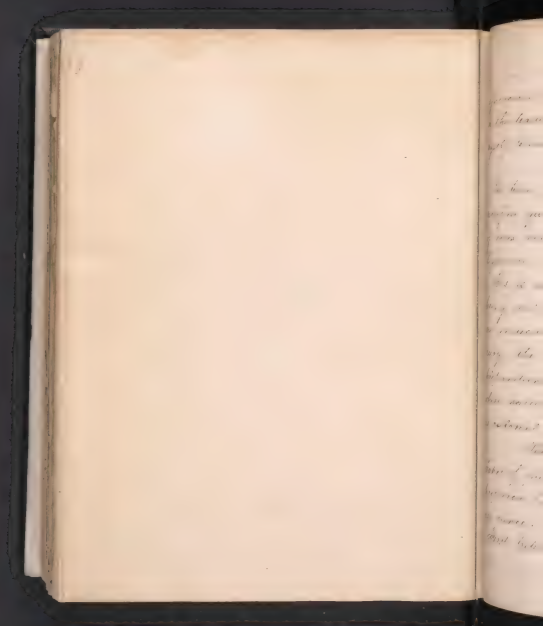
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and found it to be most important. The composition
of the gas given at 10° above 0° Fahrenheit was
5.250. It is found identical in its composition with
that of the world sometimes present pure and
is called virgin niter, but more commonly
it is found combined with some extraneous bodies
from which it is separated by chemical means.

It is now universally admitted that niter, in its
niteric state, is a gas, no more, no less, than
its ponderous, and hence it is no longer employed.
In its solid form, it is a most important
chemical and pharmaceutical treatment the process
by which these conversions are accomplished may
perhaps be reduced to oxidation in a general degree
and a union with acids, forming the niteric acids.

The long continued oxidation with carbonic acid
of miscellaneous substances, the formation of niteric
acids, and slightly oxidized, and hence the
surface, especially, is said to be atmospheric.

These processes are among the most important



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oppression. They are numerous but as they all agree
in the leading and material properties I shall confine
myself to such only as are in use at the present time.

White Sulphur,

It has been found to be made by saturating two parts of
purified quicksilver with three parts of the essence
of roses and then casting one part of powdered
sulphur into it.

It is one of the best preparations of mercury
being not at all disposed to purge. There is indeed
an evaporation which can be fulfilled by mer-
cury the purgative effect excited to which this
preparation is not adapted. It is particularly useful
where salivation is demanded being as effectual
as calomel and infinitely less harsh in its operation.

Unguentum Hydragyri Doctius

Take of purified mercury by weight two ounces
beaten card twenty three ounces, prepared cast.
one ounce.

First saturate the quicksilver with the sweet

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and a little of the cord. This is the rest of the cord, and form it into an ointment, being dissolved.

Allegandrium Hydragrygi Ointment

This is made by adding two parts of lyes cord to one part of the strong ointment.

By uniting the mercury with anelastic matter, it exists partly in a state of minute mechanical union and partly in the state of an oxide. By varying the quantity of the metal used various tests it is now ascertained that this process does take place and it seems highly probable that the efficacy of the ointment is principally owing to this circumstance. For the test of the perfect preparation of mercurial ointment is the total disappearance of the particles of the metal in the ointment being neither a vapor nor a rising matter. However this extension into glass and resins &c. &c. is not so much to be seen in the ointment as to contribute to the operation of the metal.

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The ointment is generally applied by friction on the inside of the thighs and on the back of the shoulders yet it is sometimes used as an emollient in cases of emergency one or two drachms of the strom ointment is to be intimately blended with a small quantity of mucus.

Sulphureolum Hydrargyri Rubrum

Is made by adding forty ounces of purified mercury to eight ounces of sublimed sulphur in a glass vessel the mass is afterwards to be reduced to a powder and sublimed.

This preparation of mercury is used principally as an escharotic; it is however frequently employed in the form of fumigations. For this purpose half a drachm is to be taken and thrown on burning coals, the fumes being inhaled with the breath are said to produce a violent salivation.

Hydrargyri Muricatus Corrosivus

Take of purified quicksilver, two pounds; Sulphuric acid, ten pounds and a half, mixed mixture of

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soda, four pounds. Boil the quicksilver, with the sulphuric acid in a glass vessel, placed in a sand bath, until the mass be dried. Mix this mass when cold with the mineral oil, soda then sublime in a glass cucurbit, with a heat gradually increased. Lastly separate the sublimed matter from the scoria (Foxes Dispensatory).

This is the most powerful of all the mercurial preparations. The dose cannot safely exceed one fourth of a grain, the usual dose to commence with is from one eighth to one sixth of a grain, either in form of a pill or solution in water or acrid spirits.

Hydragyrus Mercurialis Mitis

The last of the preparations of mercury of which I shall speak is calomel. It differs chemically from the corrosive mercurial of mercury, merely by containing less oxygen and a smaller quantity of mercurial acid.

It is therefore a submercurial of mercury, and is so denominated in the Edinburgh Pharmacopoeia.

Calomel is considered as the most valuable

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of all the mercurial preparations, and admits
of the widest application in the practice of our
profession.

The General Operation of Mercurials
on the body.

There appears to have been various theories as to the
modus operandi of mercury. Some have supposed,
that the specific gravity of the particles of mercury
might give it more than usual force in dividing
the coherent portions of our fluids; diminishing
the consistence of the blood; and very much in-
creasing its fluidity, but if it be attended to that
as the particles of all bodies, by being divided
have their surfaces so much enlarged in proportion
to their quantity of matter that the resistance to
their passage through fluids is so much increased,
that the heaviest of all bodies, gold, can be so
divided, as to be suspended in water, and though
we cannot precisely determine how much the
particles of mercury may be divided in its

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different preparations yet it may be confidently
 assumed that it is all at them times in so much
 divided as to take off entirely the effect of their
 gravity. I saw a case in the strait of this
 summer of a woman who had taken but three
 grains of mercury, and yet she was affected with
 a profuse salivation. In this instance, the ptyalism
 could not have been induced by the specific
 gravity of the mercury. I have also seen several
 instances of salivation brought on by a common
 cathartic of aloes and perhaps such facts shew
 render this doctrine utterly untenable. for though
 it may be difficult to detect their chemical
 properties yet if they acted upon mechanical
 principles, they might be undoubtedly discovered
 by their weight, whereas no such ponderous par-
 ticles have been discovered in the blood.

It has been maintained by some writers that
 mercury exerts a specific gravity action on the
 noxious matters themselves in the animal body

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separate from the diseased actions in the body. If mercury acted on the noxious matter only, it might be supposed to be in two ways either by destroying its qualities by decomposing it, or by attracting it and carrying it out of the constitution. If the first were the action of mercury, then we might reasonably suppose that quantity alone was to be depended upon; if the second, that the quantity or the evacuation would be the principal circumstance.

But physicians of the present day recognise no specific medicines; and are willing to keep open the door of investigation on such subjects as are unexplained by acknowledging their want of information. Besides an inquiry into the more abstruse and unexplained regions of medical science.

The opinion, that mercurial medicines produce their effects on the body by acting as stimulants is probably the most prevalent and the best supported of any yet advanced.

the property of irritability in the animal body is the basis on which this theory is founded.

Stimulants may be defined to be such powers as are capable of increasing the action of parts. Thus they do so acting on the irritable fibre, even when separated from the brain and by producing sensation under other circumstances. The most obvious effects of mercurials in the body are such as correspond with the phenomena of excitement, or the action of a stimulant on the irritability.

That mercury, in a combined state, is a stimulant is evident from the following considerations.

The preparations of mercury increase the action of the stomach and intestines. The peristaltic motion of these organs is by most of the preparations of the mineral, sensible, and by some of them somewhat excited and the emetic and cathartic effects are among their most active properties.

They act very powerfully on the glandular organs by increasing their secretions and promoting

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discharges from the excretories of the skin, salivary glands, and other excretories almost without exception throughout the body.

They increase the action of the heart and arteries, quickening the pulse in some instances, and in others rendering it stronger and fuller; consequently increasing the momentum of the circulating blood, and in this way rousing the whole system into action, and it is this action which constitutes the febris mercurialis of salivated patients.

Operation of Mercurials as Stimulants

Whether mercurial preparations produce their effects by acting upon the surface to which they are applied, and so operating upon other parts of the system by sensation, or whether they are absorbed into the vessels, and hence extend their stimulant powers over the body, are questions which have not been resolved.

That the emetic and cathartic operation of these medicines depends on their action as compound

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bodies on the stomach and intestines. I should suppose
 would hardly be denied, when it is understood, that
 no known powers exist in these organs capable of
 decomposing mercury, according to the common
 rules which govern that function, a longer space
 of time, it should seem, would be required for
 the purpose. It is known that no degree of heat
 exists in the stomach sufficient to reduce these
 oxides we may therefore venture to conclude, that
 their evanescent effects depend upon their corrosive
 action on the surface, which they are applied.

It may be next inquired whether these medicines are
 absorbed into the blood, either being taken up by the
 vessels of their surfaces and carried into the
 common mass of the blood, thus passing the ultimate
 ramifications of that system even to the secretory organs
 or excrements of the body, or whether they act upon
 the glands and other remote parts from dyspeptic
 alone.

If it could be proved, that they exert their

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whole effect upon the first passages and the absorbent surfaces in general, there would be no reason to suppose that a new absorption is to be expected.

The phenomena of exhalation would then be referred to the principle of sympathy, and with the metal and the oxygen be considered as identical.

It is supposed that the more extensive effects of these medicines upon the circulation is not to be accounted for in the ordinary search having made for them in the blood and other fluids.

If no excretion could have taken place, even to absorption, enabling excretion to have taken place, the mercury must have existed at some place within the system in its excretory state.

There have been a number of experiments made for the purpose of detecting any mercury that might have been absorbed into the 'mass' of the fluids, upon recent under the powerful influence of a mercurial wash. They have furnished no evidence that either the blood or saliva becomes impregnated with the metallic substance.

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The doctrine, that mercurial medicines act in measure of their oxygen, seems originated with Dr. Boerhaave and Wistar; and Dr. Sydenham observes that he has prepared an oxygenated balsam which was far superior to the black sediment and which produces the same effects.

It may be true that oxygen is an essential constituent of most saturating mercurials and yet, even the activity of the mercurial preparations may not depend on this alone. Gum and Resin it has been known to be sorbents also but no mercury is furnished by these vehicles.

That the general stimulant power of oxygen is strengthened and extended by its union with the quicksilver appears probable and various considerations favour the conclusion that it is absorbed into the secretory vessels the fact that no separation of the two constituents is observed by decomposition in the stomach.

Mercury is found to produce no sensible effect on the salivary glands even in the highest cases, in cold tan lineum raris, but as it operates in this way

sympathetically, & as a stimulant, more in the first stage
upon the surface of the formation, & of the skin it
might be expected to act sooner. This seems to support
the former observation.

Decomposition. Dr. Lethbridge's experiment was, obtained
from mercuric iodide a small amount and a
quantity of mercury in solution; and that that saw
two instances of speedy saturation, where it had
been used for increase of the weight, a serious instance
of the facility with which this form of admin-
istration may be used. When breathing pure oxygen
alone we do not know that saturation has ensued.

is also obtained from the oxygenated mercuric
iodide used and saturated.

that which is furnished by nitrous acid, well and
formly saturates in hot animals.

The use of the metallic part of the preparations
of mercury, may be to remove the combined oxygen to
all parts of the system, there to saturate a gradual con-
dition of this part of the compound, in an equal

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and uniform manner, and communicate it to every part of the body. thus acting as a powerful stimulant when the blood gets particularly pouring, the same exerting its various action in their secretory and excretory ducts, for the purpose of effecting which, the nature of the urine and the universality of its distribution are so admirably adapted.

There are several ways in which these medicines are employed with a view of introducing them into the system. but all of them are by the skin. the organs of respiration, and the alimentary canal. the latter comprehending the stomach, the large intestines when by enema, and the inside of the mouth, the introduction of the medicine is, in general, easily effected. but in the former, it is sometimes found to be not readily accomplished.

The absorbents of the skin have been thought only to imbibe, such articles, especially in a fluid form as are presented to them until their peculiar qualities prevent their admission. However, experience has

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been examined it doubtless whether such power exist
in the system which has been previously mentioned, and
more precisely not without mechanical means with
which it is difficult to introduce matters in this way.

The orifices of the absorbents are so situated under the
cuticle, that it is sometimes almost impossible to make
mercurial vapours enter them without removing cut
covering.

There have been a number of experiments performed
by Dr. Roussin of this sort which go to prove that
there are but very few substances taken up by
the cutaneous absorbents; he exposed the whole
surface of his body to the fumes of mercury, and
yet avoided a salivation by breathing through
a tube which carried off the ven. into the common
atmosphere.

It sometimes may happen by the skin or through
the medium of respiration, mercury is received into
the system the preparation probably undergoes a great
and even partial by a sort of digestive action at

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the vessels the metal giving a kind of fixation to the oxygen, by which it is conveyed and applied to the extremities of the secretory and exhalant vessels.

That it actually pervades the system, and passes through the cutaneous vessels to the surface of the body, is witnessed by its there producing the proper mercurial influence upon such other metallic substances as are introduced & it for instance the tooth, as fuses rings of the saturated subject.

Admitting that the mercurium is thus actually absorbed, it is true on the supposition that this oxygen is partly expended upon the blood vessels & solids of the body, it would be reasonable to expect, that the metallic part of the medicine should somewhere adhere in its ^{original} form.

But is there any thing unphilosophical in conjecturing, that this oxygenating process, the vessels not only separating the oxygen from the metal for certain purposes, in the mass of the fluids but also splitting the latter from the surface in such manner as not generally to unite to solution?

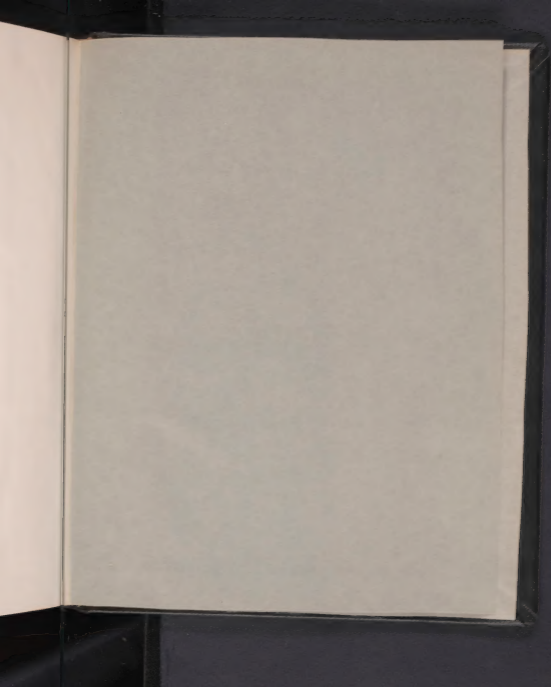
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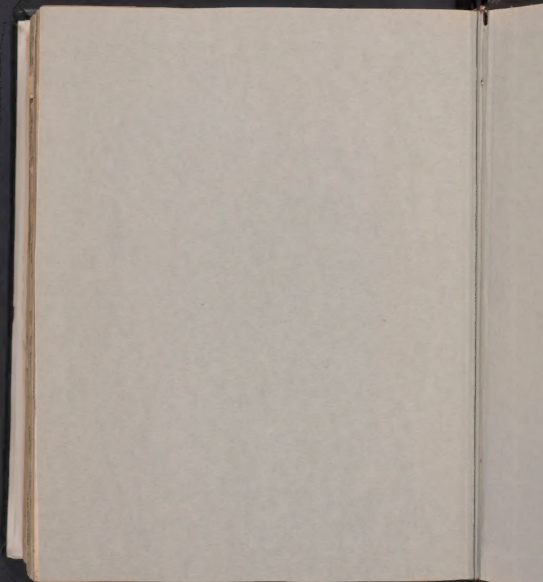
It is sufficiently acquainted with the circumstances of digestion in the stomach, to pronounce absolutely upon the nature of that function, or upon the changes which the variety of substances which are exposed to its action undergo? The processes which take place in the blood vessels and the absorbent and exhalant system are equally concealed from our researches.











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